

STS

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EPA Region 5 Records Ctr.



361403

September 24, 2008

Mr. Steven Faryan, On-Scene Coordinator
U.S. Environmental Protection Agency – Region 5
77 W. Jackson Boulevard
Chicago, IL 60604

Re: Gas Probe ML-6 Investigation
Mallard Lake Landfill
AOC RCRA Docket 7003-5-08-001
STS Project No. 200704805

Dear Mr. Faryan:

As discussed in our meeting on September 18, 2008, STS is submitting a revised plan for investigating the nature extent of combustible gas detected in the vicinity of probes ML-6i and GPT-8. The plan has been amended to include additional investigation locations as requested by Mr. Om Patel of Weston Solutions, Inc. (Weston). The proposed investigation summarizes the approach to identifying the source and the extent of gas migration in the vicinity of probes ML-6i and GPT-8. As previously discussed, several potential sources of combustible gas may exist. The potential sources of gas which should be evaluated include the following:

- The sanitary sewer force main;
- The Mallard North Landfill;
- The Mallard Lake Landfill; and
- Biogenic and/or swamp gas from decomposition of organic matter.

However, swamp or biogenic gas would not be likely to contain volatile organic compounds (VOCs) which were identified during the previous summa canister monitoring conducted during July 2008. Thus, even if the methane is the result of biogenic gas, it is apparent that a source of VOCs must also exist.

1.0 ML-6i Investigation Plan

Due to the number of potential sources, STS believes that it will be more productive to initiate the investigations in the vicinity of ML-6i and to work out radially to map the extent of combustible gas and identify the source of the gas migration. Figure 1 provides a probe location diagram depicting the locations of proposed monitoring probes in the area surrounding ML-6. As discussed in our phone conversations, the investigation has initially been restricted to the Forest Preserve District of DuPage County (FPDDC) property in order to minimize any delays associated with negotiating access to adjoining properties. If necessary, the investigations may be expanded to adjacent properties based on the field characterization of the extent of the gas. The investigation of the offsite areas can commence once signed access agreements have been obtained. As discussed in the September 18, 2008 meeting, STS proposes that the extent of the combustible gas be investigated utilizing the following tools:

- 1) Geoprobe borings will be advanced to install gas monitoring probes in order to investigate the extent of gas migration;

- 2) Shallow soil gas monitoring will be conducted along the alignment of the sanitary sewer force main in order to evaluate potential gas migration within granular backfill; and
- 3) Finally, gas monitoring probes which indicate the presence of combustible gas and/or elevated photoionization detector (PID) readings will undergo summa canister analyses for VOCs.

The proposed investigation procedures are described in greater detail in the subsequent paragraphs.

1.1 Gas Probe Installation

Figure 1 depicts the proposed investigation in the vicinity of ML-6. A total of eleven geoprobe borings will be advanced around probe ML-6 to delineate the extent and the source of the combustible gas. The proposed probe locations have been limited to FPDDC property so that the scope may be quickly implemented without having to negotiate off-site access agreements. It is anticipated that the investigations will be conducted using a track mounted Geoprobe™ rig. The holes will be advanced to a depth sufficient to attain a minimum boring bottom elevation of at least 750 ft mean sea level (msl) (approximately 45 ft below ground surface [bsg] in the vicinity of ML-6 and approximately 14 feet below the mean pool elevation on the West Branch of the DuPage River). This will enable screening of the vertical interval where the methane was identified at ML-6i (screen interval from 750.5 to 769.7 ft. msl) and will also enable the boring to be advanced the lowest observed piezometric surface for the W1/W2 granular unit. The borehole will be sealed around the GEM 500 inlet using a plastic or rubber grommet after every geoprobe run (approximately every 4 ft) to screen for the presence of methane. The screen interval of the probe will be placed such that the screen zone of the probe extends at least 4 ft above the 1st gas detection interval and approximately 10 ft below this interval (i.e., the interval will be spanned using a 15 ft screen interval). The probe screen interval will be backfilled with sand and a granular bentonite seal will be placed above the flush mount screen and will be hydrated. A sealed flush mount protector casing will be installed to provide a surface completion.

Probe ML-6i was drilled to a total depth of 41.1 ft from a surface elevation of approximately 793.0 ft msl. Probe ML-6i was completed with a 20 ft screen interval extending from approximately 752 ft to 772 ft msl. Thus, the probe is completed across an interval extending from approximately 10 feet below the river bed to approximately 8 feet above the river mean stage pool elevation (approx 764 ft msl).

As shown in Figure 1, probes ML-13 and ML-15 will be located on relatively steep slopes along the southeast side of the West Branch of the DuPage River. STS proposes that existing Mallard North Landfill monitoring wells MW-204S and MW-205 be monitored in lieu of the two additional river bank probes requested by Weston during the September 18, 2008 meeting. Well MW-204S is screened from 742.0 to 756.5 ft msl and Well MW-205 is screened from 742.9 to 757.9, thus the top of both well screens are located approximately 5 ft below the base of the West Branch of the DuPage River (estimated base elevation 762 ft msl, Mean Pool Elevation 765 ft. msl). As such, wells MW-204 and MW-205 are well positioned to identify potential gas and/or groundwater migration from the Mallard North Landfill below the river. Due to the difficult topographic conditions and the presence of the existing monitoring wells, STS believes that the western side of the area will be adequately delineated using the two additional probes ML-13 and ML-15 in combination with existing monitoring wells MW-204S and MW-205. STS also proposes that the deep monitoring well MW-204D also be screened for the presence of combustible gas, to verify that a deeper pathway does not exist below the river. The as-built construction information for the Mallard North monitoring wells MW-204S and MW-205 are provided in Attachment 1.

Several of the proposed gas probe locations (ML-13, ML-15 and ML-18) are anticipated to be located in difficult to reach areas. Even with the track mounted geoprobe rig, it may be necessary to implement some site access improvements which may include benching or slight regrading. Slope restoration work will be undertaken by BFI or their contractors, when conditions allow.

1.2 Gas Probe Monitoring

Upon completion, the probes will be monitored for the presence of CH₄, CO₂, O₂ and balance gas using a LandTech GEM 500. The results of the monitoring will be utilized to determine the extent of the migration, to identify the source of the methane and to evaluate the possible need to expand the characterization to adjoining properties. To assist with identifying the source of the methane, probe locations where methane is detected will also be monitored for VOC concentrations according to method TO-15. The VOC sampling will also be

conducted at probe ML-6i to assess whether the source of the VOCs is correlated to the elevated methane levels detected in this probe. Gas samples collected from probe ML-6i and other surrounding probes which indicate the presence of methane may also be analyzed for stable isotopes including carbon 13 ($\delta^{13}\text{C}$), deuterium (δD) and Oxygen 18 ($\delta^{18}\text{O}$). This data will be utilized to determine whether the methane found at depth might consist of microbial gas generated from acetate fermentation (i.e., landfill gas), microbial gas from CO_2 reduction or thermogenic gas (i.e., natural gas or coal gas). Refer to Coleman et al. 1993 for a more extensive discussion of isotopic gas fingerprint characterization.

1.3 Shallow Soil Gas Profiling

As discussed above, STS proposes that a shallow soil gas survey be conducted along the alignment of the sanitary sewer force main. Previous summa canister sampling conducted at the force main vent has indicated the presence of numerous VOC constituents in the gaseous emissions from the vent. The assemblage of VOC constituents at the force main vent is very similar to those identified at in the July sampling in both ML-6 and the ambient air sample obtained adjacent to ML-6. Thus, it appears that the gas release vents from the force main might act as a potential source of VOCs and methane detected at probes ML-6 and ML-6i. As such, a soil gas survey is proposed that will attempt to sample the granular backfill along the alignment of the sanitary sewer force main. The survey will consist of driving a ½ inch diameter hole to a depth of approximately 3 ft. A sampling probe will be installed in the pilot hole and will be sealed at the ground surface using a rubber grommet with hydrated bentonite. Assuming that the granular backfill materials are encountered then the probe will be purged of approximately 3 volumes of air (approximately 0.3 L) before the gas concentrations are monitored. The soil gas samples will be analyzed using the LandTech GEM 500 (CH_4 , CO_2 , O_2 and balance gas) and using a multiple gas meter which includes PID, H_2S and methane LEL. Finally, STS will also analyze the Gem 500 pump exhaust port using low level methane detection equipment. The soil gas samples will be conducted at approximately 100 ft intervals extending from the northern property boundary (i.e., adjacent to the baseball diamond) to a point due west of ML-18 (approximately 900 ft southwest of northern property boundary initial starting point). If any indications of VOCs or combustible gas are detected, the density of the sample locations will be increased by split spacing the soil gas test locations at 50 ft intervals. More samples can be added as necessary to better delineate any potential areas where methane or VOCs are encountered.

The results of the soil gas analyses may be utilized to help direct the geoprobe investigations. If elevated methane concentrations are detected at the soil gas locations, the proposed gas probes may be relocated to these areas (if within 100 ft. of the location shown in Figure 1). If the proposed soil gas probe locations (refer to Figure 1) are not within 100 ft of any location where shallow soil gas methane is detected then it might be necessary to install an additional gas probe to help characterize concentrations.

2.0 GPT-7 and GPT-8 Characterization

Pursuant to discussions during the September 18, 2008 meeting, the methane exceedance at probe GPT-8 will be investigated to determine the extent and the source of the methane exceedance. Both GPT-7 and GPT-8 were advanced to a depth of 20 ft below grade from a surface elevation of approximately 768 ft msl. Thus, both borings were advanced to approximately 748 ft msl which is deeper than the gas migration zone identified at ML-6. Saturated conditions were encountered at the base of both of the geoprobe holes. The gas concentrations encountered at probe GPT-8 appeared to be migrating above the water table but below the clay interface at a depth of approximately 8 ft. Probes GPT-7 and GPT-8 were completed across the top of the sand interval at elevations ranging between approximately 754 and 765 ft msl. STS, BFI and the FPDDC believe that this is the primary potential gas migration pathway that requires investigation.

2.1 Installation of Additional gas Probes

Pursuant to the discussions during September 18, 2008 meeting, two additional gas probes (GPT-9 and GPT-10) will be installed between the Mallard Lake Landfill and probe GPT-8. An additional probe, ML-18, will be installed within the Mallard Lake Forest Preserve approximately half way between probe ML-6i and the Mallard Lake Landfill. The approximate location of proposed probe ML-18 is presented in Figure 1.

As discussed during the meeting, the additional probes (GPT-9 and GPT-10, refer to Figure 2) will be advanced using a geoprobe rig. If possible, the probes will be advanced to depths corresponding to the base of the deepest portion of the landfill (approximately elevation of 742 ft msl). Assuming a surface elevation of 770 ft msl, it is anticipated that the geoprobe boring will be advanced approximately 38 to 40 ft. bgs in order to investigate to the depth of the landfill invert (base of waste). Attached cross-section (Figure 3) depicts the geologic conditions along the northeast side of the landfill. The cross-section indicates a relatively persistent sand unit occurring approximately between elevations 752 ft. msl and 764 ft. msl. This is the same sand unit where well GPT-8 is completed. Likewise, gas probes GPT-Is and GPT-Id are completed either within or immediately above this unit. These probes are also believed to have been historically influenced by gas migration through this sand unit.

Based on the well construction detail for well G54S (refer to Attachment 2) located along the northeast corner of the landfill, it is apparent that the deeper sand seams in the area are saturated. The hydrograph indicates that since well G54S was installed and initiated monitoring in the 1st quarter of 2001, the groundwater elevation has consistently ranged from a low of 749.6 (after 2005 drought) to a high of 756.6 ft msl. As shown by the well completion detail in Attachment 2, well G54S is screened from 740.3 to 735.3 ft. msl and at least 7 ft below the historical low groundwater table observed during the 2005 drought. No combustible gas has been observed in the headspace of well G54S during any of the monitoring rounds. Thus, the lack of an unsaturated or vadose zone combined with the fact that no gas has been observed in the deeper sand seams makes it very unlikely that any of the deeper granular units along the northeast side of the landfill could have acted as a gas migration pathway. Given review of the historical water level hydrographs, there is no reason to believe that these deeper sand units are periodically unsaturated in a manner which would allow the unit to act as a possible gas migration pathway.

Nevertheless, pursuant to USEPA's and Weston's requests during the September 18, 2008 meeting, the geoprobe investigation will seek to install GPT-9 and GPT-10 into a deeper sand unit or to the landfill base invert elevation (approximately 38 to 40 ft bgs). The geoprobe borings will be advanced and the borehole will be screened for the presence of methane after the removal of each 4 ft sample run. It is anticipated that a 4-1/4 inch inside diameter hollow stem auger may need to be advanced 10 to 15 ft to maintain the borehole at depths where collapsing granular deposits are encountered. It may not be possible to obtain discrete methane measurements within the borehole at these depths.

If any gas is detected within the shallow granular zone at the GPT-9 or GPT-10 locations, it may be necessary to install a shallow nested gas monitoring probe. Thus, it is possible that a maximum of four (two nests of 2 probes) gas probes may be installed if multiple sand units are encountered which require monitoring. The probes will be instrumented with 1 inch inside diameter, schedule 40 PVC riser pipe and 0.010 inch slotted well screen. It is anticipated that the well screen will not be any longer than 10 ft in length. The screen will be backfilled with a # 20-40 mesh gradation sand and the annular space will be backfilled with granular bentonite which will be hydrated in lifts. The probes will be completed with a locking stick-up style protector casing.

2.2 Gas Probe Monitoring

Each of the new probes described in Section 2.2 will be monitored for the presence of landfill gas related constituents and/or atmospheric gas components (i.e., CH₄, CO₂, O₂ and balance gas). The results will be reviewed in the context of the results from GPT8 and GPT-Is to determine whether current or past landfill gas migration has occurred. If the gas at GPT-8 is isolated and does not appear to be contiguous with either the landfill or probes which have previously exhibited elevated methane levels (i.e., GPT-Is) then STS may recommend that the wells undergo gas composition testing in a manner similar to that described in section 1.2. The presence of VOCs or isotopic composition indicative of landfill gas might be used to rule out other potential sources (i.e., biogenic gas). Similarly, the data from this area will be evaluated in conjunction with the results from probe ML-18 and the other monitoring locations which will be installed in the vicinity of ML-6 in order to determine whether the gas has migrated from the south (i.e., Mallard Lake Landfill area).

If the gas at any of the probes is identified as being derived from the Mallard Lake Landfill, it will be necessary to amend the east side remedial action plan to include additional probes.

Please do not hesitate to contact us at 847-279-2500 if you have any questions or comments on the proposed work scope.

Sincerely,



Steven C. Kornder, Ph.D.
Senior Geochemist



Craig S. Rawlinson, P.G.
Associate Hydrogeologist

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cc: Eric Ballenger, BFI
Jim Hitzeroth, BFI
Joe Benedict, Forest Preserve District of DuPage County
Om Patel, Weston Solutions, Inc.

Attached: Figure 1 – ML-6 Investigation Probe Location Diagram
Figure 2 – Map Showing Locations of Probes GPT-7 and GPT-8
Figure 3 – Geologic Cross Section
Attachment 1 – Well MW-204S, MW-204D and MW-205 Well Construction Details
Attachment 2 - Well G54S Well Completion Diagram, Boring Log and Hydrograph
Attachment 3 – Previous Investigation Boring Logs and Well Details

Gayle

1032
8 + 10
2000

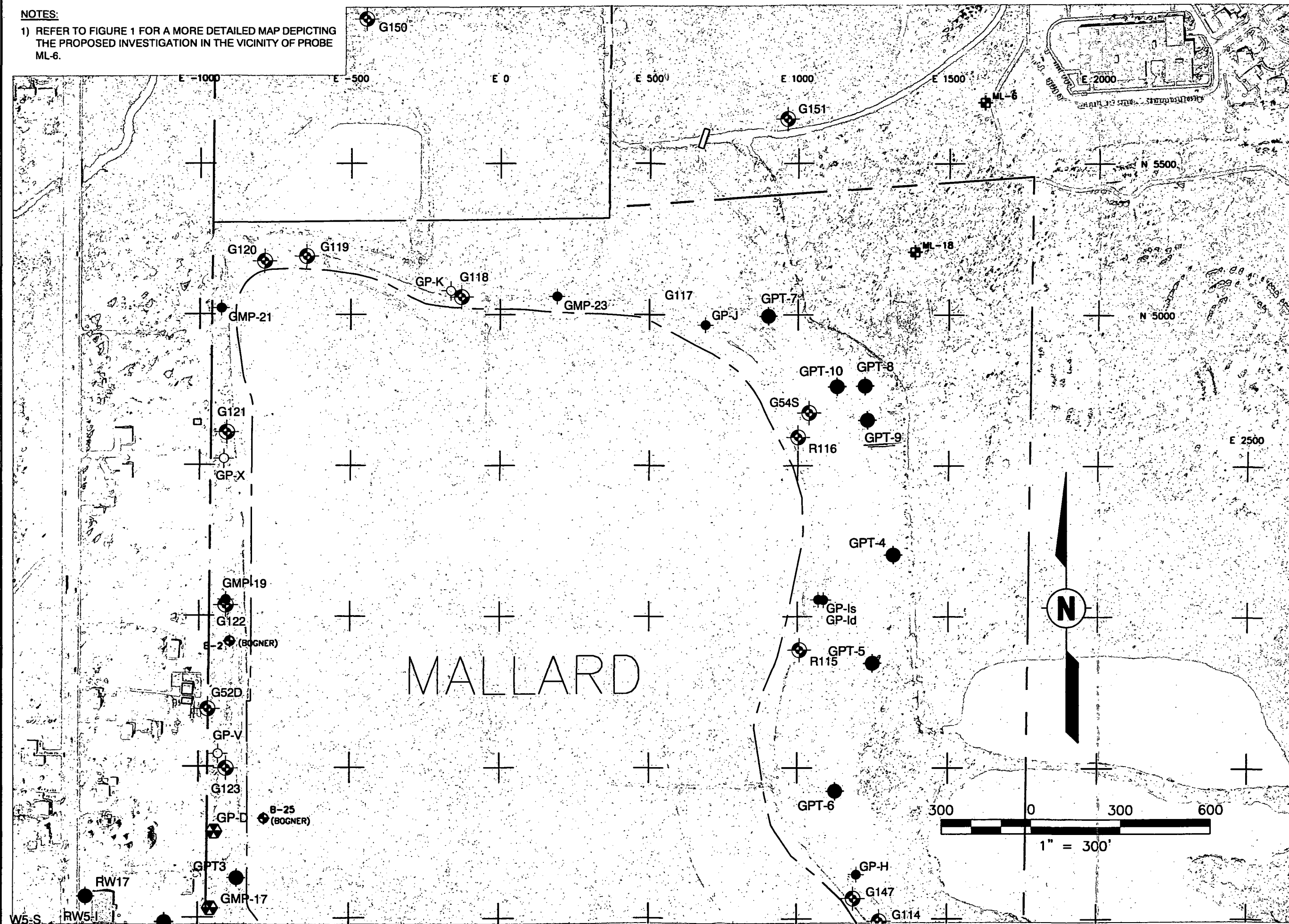
121
121
121

Mallard Lake - ML-6



NOTES:

- 1) REFER TO FIGURE 1 FOR A MORE DETAILED MAP DEPICTING THE PROPOSED INVESTIGATION IN THE VICINITY OF PROBE ML-6.



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MAP SHOWING LOCATIONS OF PROBES GPT-7 AND GPT-8
AND ML-6 RELATIVE TO THE
MALLARD LAKE LANDFILL MONITORING SYSTEM

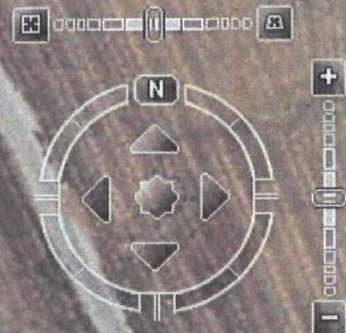
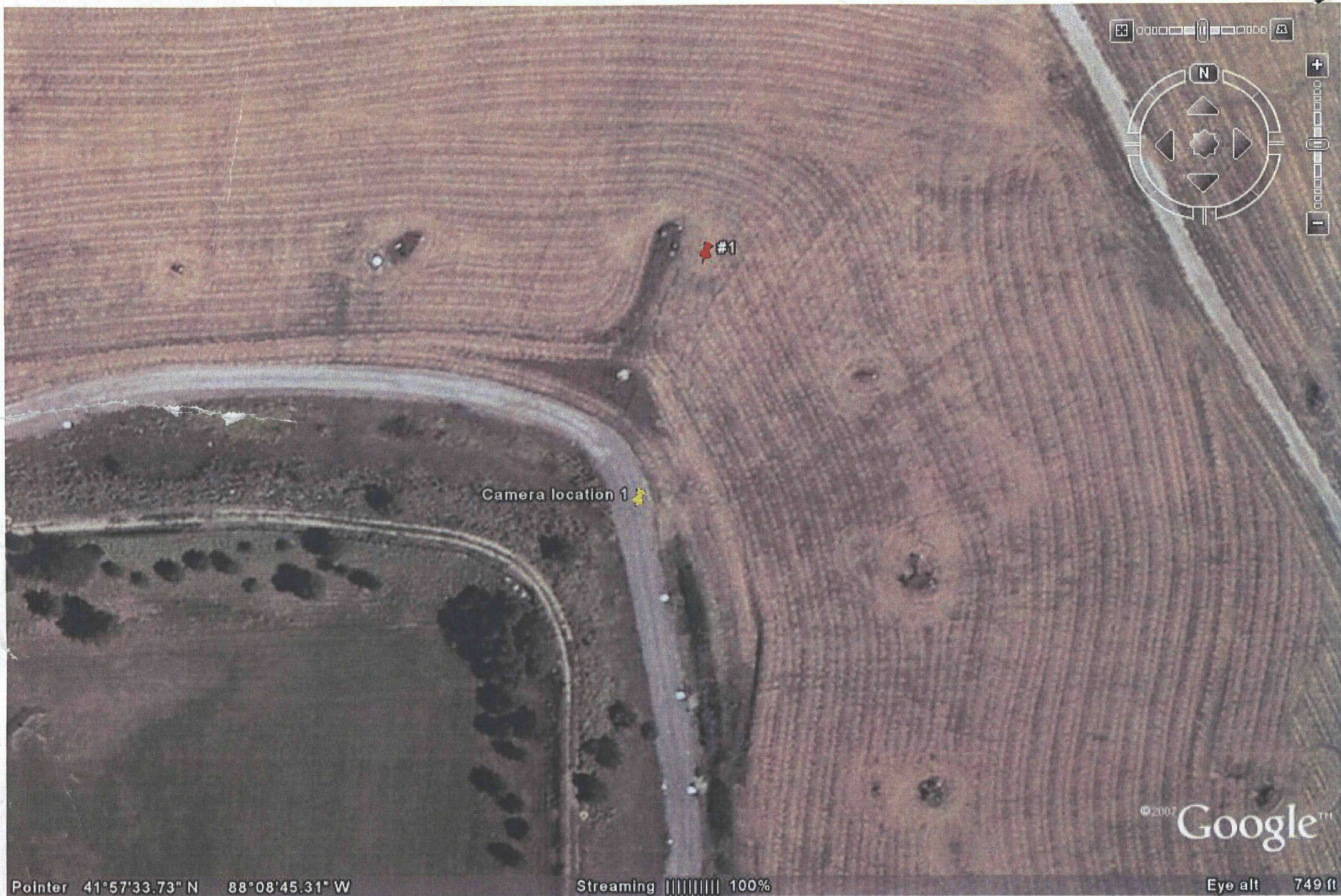
Drawn: KLC 09/10/2008

Checked: CSR 09/10/2008

Approved: CSR 09/10/2008

PROJECT NUMBER 200704805

FIGURE NUMBER 2



Camera location 1

#1

©2007 Google™

Pointer 41°57'33.73" N 88°08'45.31" W

Streaming ||||| 100%

Eye all 749 ft

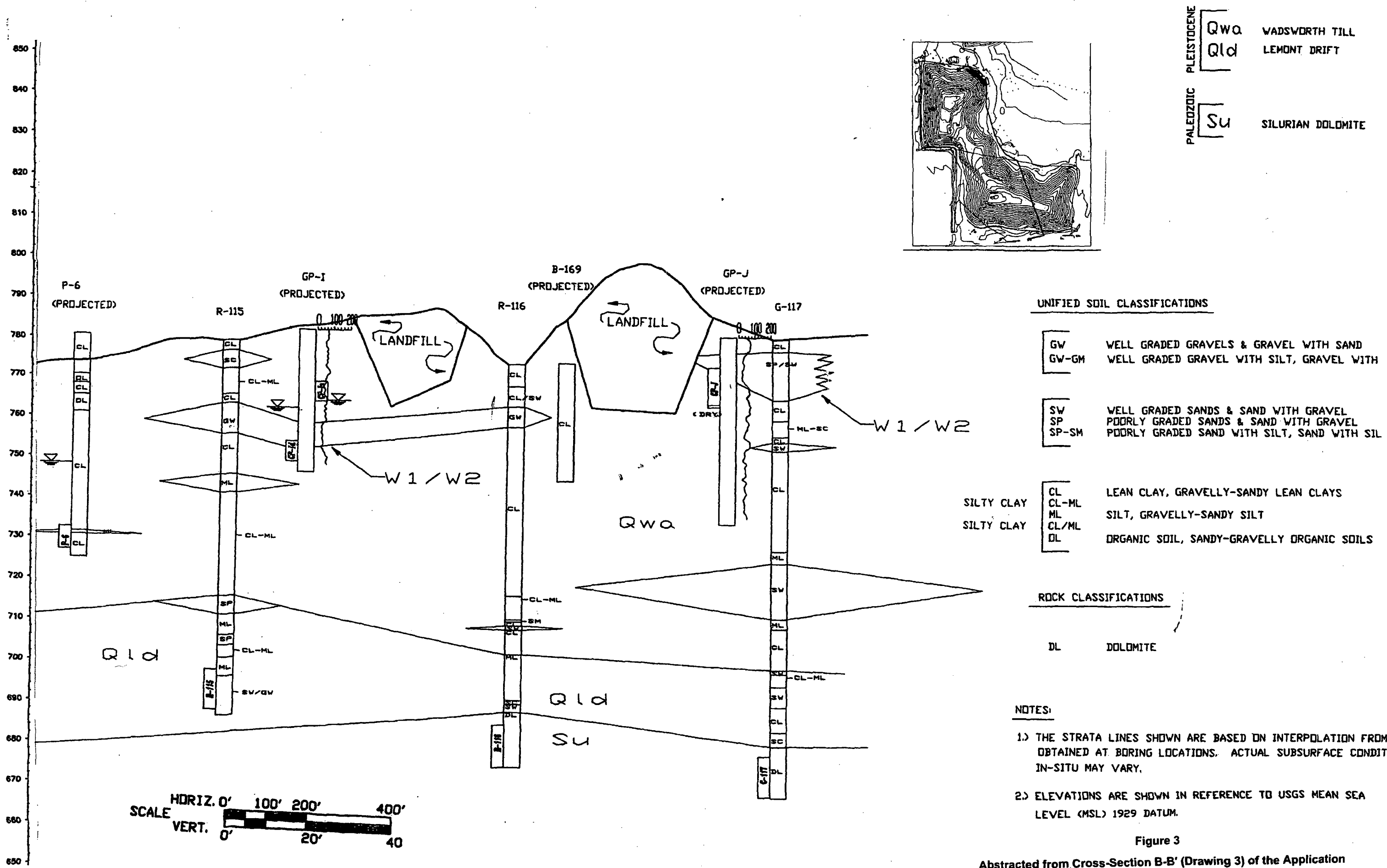
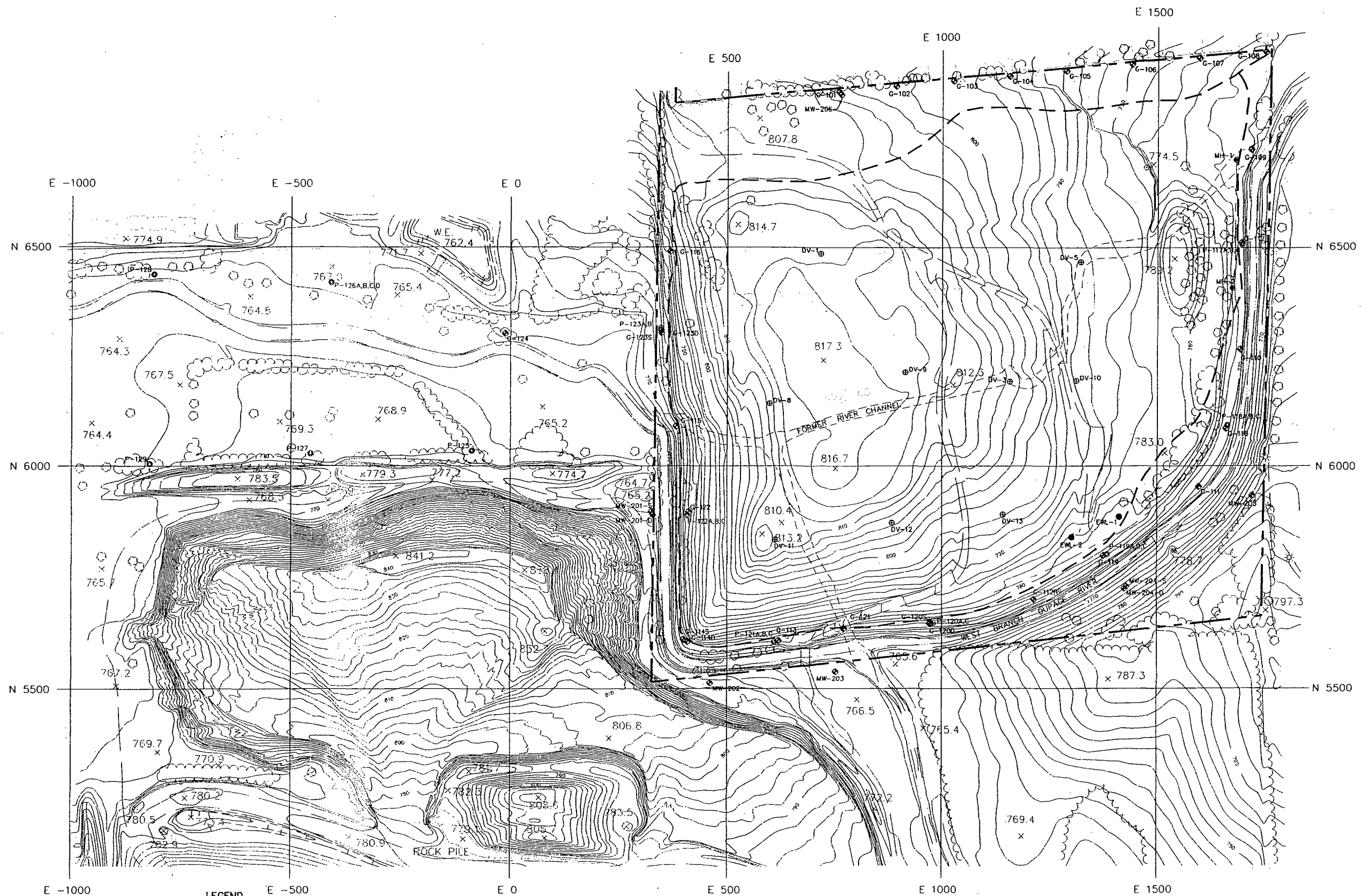
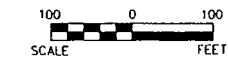


Figure 3
 Abstracted from Cross-Section B-B' (Drawing 3) of the Application for Significant Permit Modification to Assess the Adequacy of the Till Monitoring Network (STS December 1999)





- LEGEND**
- 790 --- EXISTING CONTOUR 10'
 - 760 --- EXISTING CONTOUR 2'
 - MW-204 ● NEW MONITORING WELL LOCATION
 - G-124 ● MONITORING WELL LOCATION
 - P-125 ● LIQUID PROBE LOCATION
 - EWL-1 ● EXTRACTION WELL LOCATION
 - DV-12 ● GAS VENT LOCATION
 - PROPERTY LINE
 - APPROXIMATE LIMIT OF REFUSE
 - FORMER RIVER CHANNEL
 - LEACHATE COLLECTION SYSTEM
 - MH-1 ● LEACHATE COLLECTION SYSTEM MANHOLE



NOTE:
TOPOGRAPHIC MAP PROVIDED BY MARTINEZ CORP.
DATE OF CONTOURS 11/94.

REV	DATE	DESCRIPTION	DWN BY	DES BY	OWN BY	APP BY
1	9/10/99	PPV				
2		PLV				



MALLARD NORTH LANDFILL
HANOVER PARK, ILLINOIS

MONITORING WELL LOCATIONS

DRAWING NO.
1

PROJECT NO.
795416



EMCON

603 E. Diehl Road, #123
Naperville, Illinois 60563

LOG OF BORING MW-204

Page 1 of 2

PROJECT NAME: Mallard North Landfill

DATE: December 21, 1998

PROJECT NUMBER: 795416

DEPTH TO WATER:

LOCATION: Hanover Park, Illinois

TOTAL DEPTH: 50.0 feet

LOGGED BY: Mike Barinek

DRILLER/METHOD: Fox / HSA

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
	SS-1	N=16				OH	Black organic topsoil, moist, roots, some gravel	
	SS-2	N=23				CL	Lean clay, moist, brown and gray, some sand and gravel	
	SS-3	N=39					gray	
	SS-4	N=35						
	SS-5	N=22						
10	SS-6	N=23						
	SS-7	N=18						
15	SS-8	N=29						
	SS-9	N=17						
	SS-10	N=17						
20	SS-11	N=40						
	SS-12	N=12						
	SS-13	N=15				SM	Silty sand, poorly sorted, subrounded, gray and brown	
25								

**EMCON**603 E. Diehl Road, #123
Naperville, Illinois 60563**LOG OF BORING MW-204** *Page 2 of 2*PROJECT NAME: *Mallard North Landfill*DATE: *December 21, 1998*PROJECT NUMBER: *795416*

DEPTH TO WATER:

LOCATION: *Hanover Park, Illinois*TOTAL DEPTH: *50.0 feet*LOGGED BY: *Mike Barinek*DRILLER/METHOD: *Fox / HSA*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
	SS-13	N=15				SM	Silty sand, poorly sorted, subrounded, gray and brown	
	SS-14	N=16						
	SS-15	N=47						
30								
	SS-16	N=28				CL	Lean clay, gray, moist, trace sand	
	SS-17	N=41				SM	Silty sand, tan, fine to coarse grained, subrounded to rounded, wet, some gravel	
						CL	Lean clay, gray, moist, some sand and gravel	
35	SS-18	N=24						
	SS-19	N=51						
						GW	Gravel, well graded, gray, wet, subrounded	
	SS-20	N=85				CL	Lean clay, gray, wet	
40						GW	Gravel with sand, poorly sorted, gray, subrounded, wet	
	SS-21	N=21						
	SS-22	N=10						
						SM	Silty sand, fine to coarse grained, gray, poorly sorted, subrounded, some gravel, wet	
45	SS-23	N=20						
	SS-24	50/6"						
	SS-25	N=59						
50							Boring Terminated at 50.0 Feet	



EMCON

603 E. Diehl Road, #123
Naperville, Illinois 60563

LOG OF BORING MW-205

Page 1 of 2

PROJECT NAME: Mallard North Landfill

DATE: December 28, 1998

PROJECT NUMBER: 795416


DEPTH TO WATER:

LOCATION: Hanover Park, Illinois

TOTAL DEPTH: 40.0 feet

LOGGED BY: Mike Barinek

DRILLER/METHOD: Fox / HSA

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
	SS-1	N=14				OH	Black organic topsoil, moist, roots, some gravel	
						CL	Lean clay, moist, mottled brown and gray, trace sand and gravel	
	SS-2	N=34						
5	SS-3	N=58					gray	
	SS-4	N=54						
	SS-5	N=22						
10								
	SS-6	N=20						
	SS-7	N=10						
15	SS-8	N=35						
	SS-9	N=15				GW	Gravel, well graded, gray, subrounded, wet	
						CL-ML	Lean clay, gray, moist, some gravel, trace sand	
	SS-10	N=15						
20								
	SS-11	N=22						
	SS-12	N=31						
25	SS-13	N=14						

**EMCON**603 E. Diehl Road, #123
Naperville, Illinois 60563**LOG OF BORING MW-205** *Page 2 of 2*PROJECT NAME: *Mallard North Landfill*DATE: *December 28, 1998*PROJECT NUMBER: **795416**

DEPTH TO WATER:

LOCATION: *Hanover Park, Illinois*TOTAL DEPTH: *40.0 feet*LOGGED BY: *Mike Barinek*DRILLER/METHOD: *Fox / HSA*

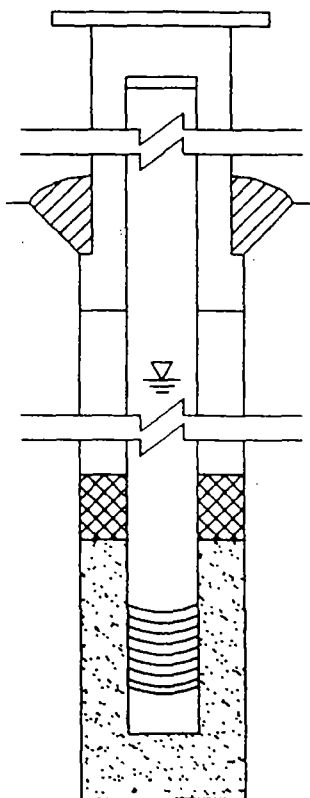
DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
	SS-13	N=14				CL-MU	Clayey silt, gray, wet, some sand, trace gravel	
	SS-14	N=14						
	SS-15	N=16						
30	SS-16	N=16						
	SS-17	N=11						
35	SS-18	N=14						
	SS-19	N=16						
	SS-20	N=16						
40							Boring Terminated at 40.0 Feet	
45								
50								



SITE #: 0434485002 COUNTY: Dupage WELL #: MW-204S
SITE NAME: Mallard North Landfill BOREHOLE #: B-204
COORDINATES: N -1178.04 E 961.33 (or) LATITUDE LONGITUDE
SURVEYED BY: ILL. REGISTRATION #:
DRILLING CONTRACTOR: Fox Contractors DRILLER: Don Eger
CONSULTING FIRM: EMCON GEOLOGIST: Mike Barnick
DRILLING METHOD: HSA DRILLING FLUIDS (TYPE): None
LOGGED BY: Mike Barnick DATE STARTED: 12/23/98 DATE FINISHED: 12/23/98
REPORT FORM COMPLETED BY: STEPHEN HEUER DATE: 4/19/99

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: CONCRETE
TYPE OF ANNULAR SEALANT: BENTONITE CHIPS
INSTALLATION METHOD: FREE DROP
SETTING TIME:
TYPE OF BENTONITE SEAL:
GRANULAR PELLET CHIPS
INSTALLATION METHOD:
SETTING TIME:
TYPE OF SAND PACK: #5 Filter Sand
GRAIN SIZE: (SIEVE SIZE)
INSTALLATION METHOD: FREE DROP
TYPE OF BACKFILL MATERIAL: (IF APPLICABLE)
INSTALLATION METHOD:



ELEVATIONS (MSL)*	DEPTHS (BGS)	(0.1 ft)
776.71	-2.31	TOP OF PROTECTIVE CASING
776.41	-2.01	TOP OF RISER PIPE
774.4	0.00	GROUND SURFACE
771.4	3.00	TOP OF ANNULAR SEALANT
753.51	20.89	WATER LEVEL (AFTER COMPLETION) DATE: 2/18/99
		TOP OF SEAL
761.4	13	TOP OF SANDPACK
756.46	17.94	TOP OF SCREEN
741.96	32.94	BOTTOM OF SCREEN
741.71	32.69	BOTTOM OF WELL
741.40	33	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS
(CIRCLE ONE)

PROTECTIVE CASING	SS304	SS315	PTPE	PVC	OTHER: STEEL
RISER PIPE ABOVE W.T.	SS304	SS315	PTPE	PVC	OTHER:
RISER PIPE BELOW W.T.	SS304	SS315	PTPE	PVC	OTHER:
SCREEN	SS304	SS315	PTPE	PVC	OTHER:

REMARKS:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	8
ID OF RISER PIPE	(in)	2.0
PROTECTIVE CASING LENGTH	(ft)	5.0
RISER PIPE LENGTH	(ft)	19.45
BOTTOM OF SCREEN TO END CAP	(ft)	.25
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	15
TOTAL LENGTH OF CASING	(ft)	34.7
SCREEN SLOT SIZE **	(in)	0.01

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

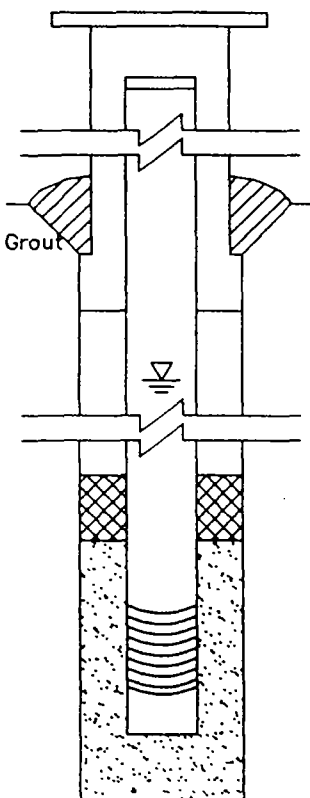


SITE #: 0434485002 COUNTY: Dupage WELL #: MW-204D
SITE NAME: Mallard North Landfill BOREHOLE #: B-204
COORDINATES: N -118.36 E 956.11 (or) LATITUDE LONGITUDE
SURVEYED BY: ILL. REGISTRATION #:
DRILLING CONTRACTOR: Fox Contractors DRILLER: Don Eger
CONSULTING FIRM: EMCON GEOLOGIST: Mike Barnick
DRILLING METHOD: HSA DRILLING FLUIDS (TYPE): None
LOGGED BY: Mike Barnick DATE STARTED: 12/22/98 DATE FINISHED: 12/22/98
REPORT FORM COMPLETED BY: STEPHEN HEUER DATE: 4/19/99

ANNULAR SPACE DETAILS

ELEVATIONS
(MSL)*DEPTHS
(BGS)

(0.1 ft)



TYPE OF SURFACE SEAL: CONCRETE

TYPE OF ANNULAR SEALANT: Cement-Bentonite Grout

INSTALLATION METHOD: TREMIE PIPE

SETTING TIME:

TYPE OF BENTONITE SEAL:

GRANULAR (PELLET)

INSTALLATION METHOD: FREE DROP

SETTING TIME:

TYPE OF SAND PACK: #5 Filter Sand

GRAIN SIZE: (SIEVE SIZE)

INSTALLATION METHOD: FREE DROP

TYPE OF BACKFILL MATERIAL: (IF APPLICABLE)

INSTALLATION METHOD:

777.53

-3.13

TOP OF
PROTECTIVE CASING

777.23

-2.83

TOP OF RISER PIPE

774.4

0.00

GROUND SURFACE

771.4

3.00

TOP OF
ANNULAR SEALANT

751.06

23.34

WATER LEVEL
(AFTER COMPLETION)
DATE: 2/18/99

740.4

34

TOP OF SEAL

736.4

38

TOP OF SANDPACK

734.18

40.22

TOP OF SCREEN

724.18

50.22

BOTTOM OF SCREEN

723.93

50.47

BOTTOM OF WELL

723.4

51

BOTTOM OF
BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION
MATERIALS
(CIRCLE ONE)

PROTECTIVE CASING	SS304	SS315	PTPE	PVC	OTHER: STEEL
RISER PIPE ABOVE W.T.	SS304	SS315	PTPE	PVC	OTHER:
RISER PIPE BELOW W.T.	SS304	SS315	PTPE	PVC	OTHER:
SCREEN	SS304	SS315	PTPE	PVC	OTHER:

REMARKS:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	8
ID OF RISER PIPE	(in)	2.0
PROTECTIVE CASING LENGTH	(ft)	5.0
RISER PIPE LENGTH	(ft)	43.05
BOTTOM OF SCREEN TO END CAP	(ft)	.25
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10
TOTAL LENGTH OF CASING	(ft)	53.3
SCREEN SLOT SIZE **	(in)	0.01

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

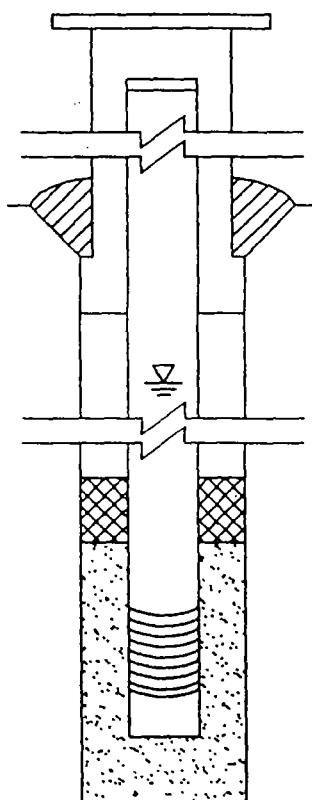


SITE #: 0434485002 COUNTY: Dupage WELL #: MW-205
SITE NAME: Mallard North Landfill BOREHOLE #: B-205
COORDINATES: N -1000.63 E 1266.85 (or) LATITUDE LONGITUDE
SURVEYED BY: ILL. REGISTRATION #:
DRILLING CONTRACTOR: Fox Contractors DRILLER: Don Eger
CONSULTING FIRM: EMCON GEOLOGIST: Mike Barnick
DRILLING METHOD: HSA DRILLING FLUIDS (TYPE): None
LOGGED BY: Mike Barnick DATE STARTED: 12/28/98 DATE FINISHED: 12/28/98
REPORT FORM COMPLETED BY: STEPHEN HEUER DATE: 4/19/99

ANNULAR SPACE DETAILS

ELEVATIONS
(MSL)*DEPTHS
(BGS)

(0.1 ft)



TYPE OF SURFACE SEAL: CONCRETE
TYPE OF ANNULAR SEALANT: BENTONITE CHIPS
INSTALLATION METHOD: FREE DROP
SETTING TIME:
TYPE OF BENTONITE SEAL:
GRANULAR PELLET CHIPS
INSTALLATION METHOD:
SETTING TIME:
TYPE OF SAND PACK: #5 Filter Sand
GRAIN SIZE: (SIEVE SIZE)
INSTALLATION METHOD: FREE DROP
TYPE OF BACKFILL MATERIAL:
(IF APPLICABLE)
INSTALLATION METHOD:

ELEVATIONS (MSL)*	DEPTHS (BGS)	(0.1 ft)
786.10	-2.5	TOP OF PROTECTIVE CASING
785.80	-2.2	TOP OF RISER PIPE
783.6	0.00	GROUND SURFACE
780.6	3.00	TOP OF ANNULAR SEALANT
761.46	22.14	WATER LEVEL (AFTER COMPLETION) DATE: 2/18/99
		TOP OF SEAL
760.6	23	TOP OF SANDPACK
757.85	25.75	TOP OF SCREEN
742.85	40.75	BOTTOM OF SCREEN
742.90	40.7	BOTTOM OF WELL
742.60	41	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETTIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS
(CIRCLE ONE)

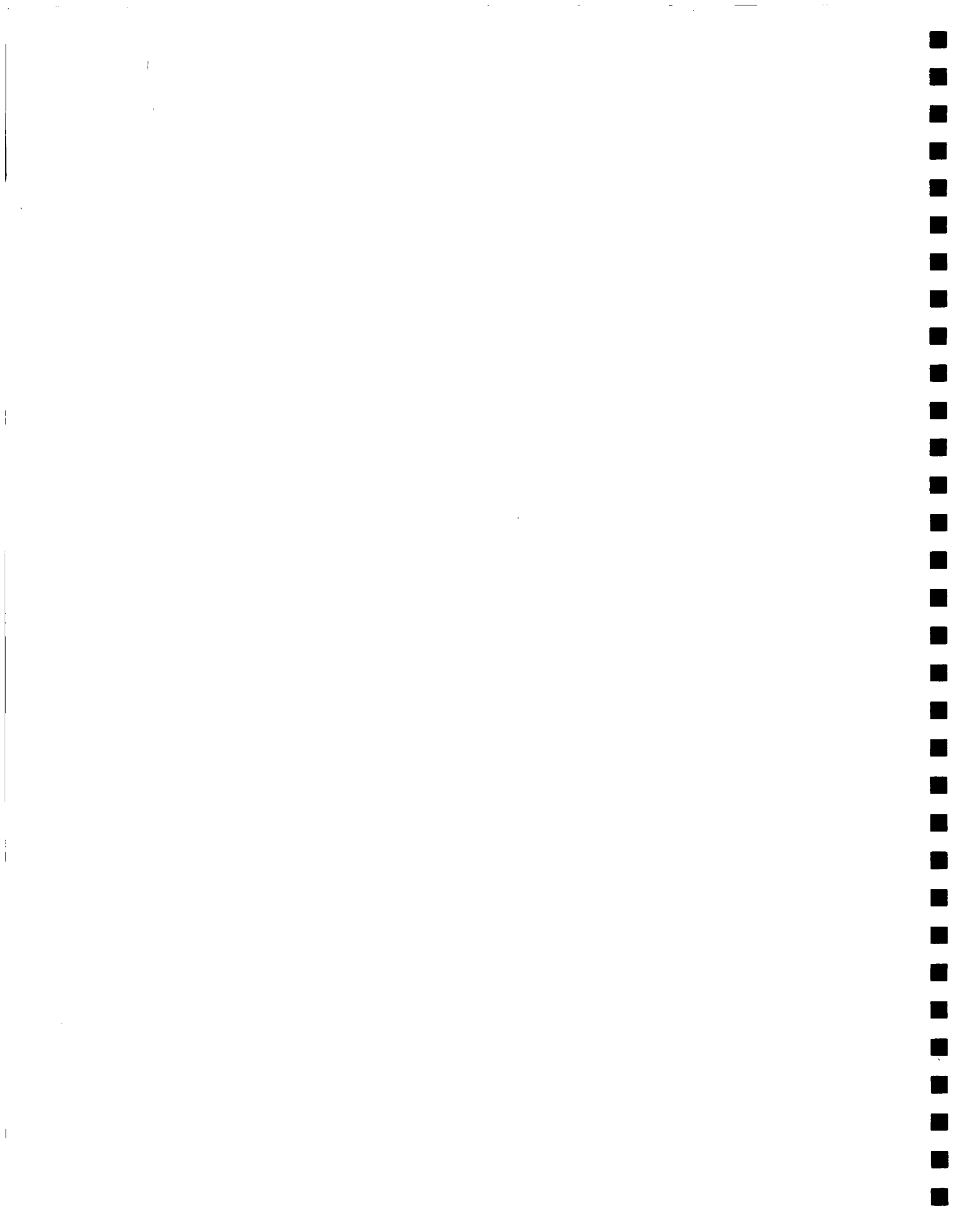
PROTECTIVE CASING	SS304	SS315	PTPE	PVC	OTHER: STEEL
RISER PIPE ABOVE W.T.	SS304	SS315	PTPE	PVC	OTHER:
RISER PIPE BELOW W.T.	SS304	SS315	PTPE	PVC	OTHER:
SCREEN	SS304	SS315	PTPE	PVC	OTHER:

REMARKS:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	8
ID OF RISER PIPE	(in)	2.0
PROTECTIVE CASING LENGTH	(ft)	5.0
RISER PIPE LENGTH	(ft)	27.65
BOTTOM OF SCREEN TO END CAP	(ft)	.25
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	15
TOTAL LENGTH OF CASING	(ft)	42.9
SCREEN SLOT SIZE **	(in)	0.01

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE



Attachment 2

Well G54S

Well Construction Information



Illinois Environmental Protection Agency - Well Completion Report

SITE # LPC-0438010004 COUNTY: Du Page WELL # G-154 BOREHOLE # G-154

SITE NAME: Mallard Lake Landfill WELL POSITION - UPGRAD, DNGRAD, UNKN (CIRCLE ONE)

STATE PLANE COORDINATE: X 551912.075 Y 1929409.60 (or) LATITUDE _____ LONGITUDE _____

SURVEYED BY: Daniel L. Zinnen ILL REGISTRATION # 035-003008

DRILLING CONTRACTOR: Layne Northwest DRILLER: Aaron Erickson

GEOLOGIST: Elizabeth Reed FIRM: Herst & Associates, Inc.

DRILLING METHOD: Air Rotary DRILLING FLUID (TYPE): Water

DATE STARTED: 9/13/00 DATE FINISHED: 9/13/00

REPORT FORM COMPLETED BY: Elizabeth Reed DATE: 10/19/00

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: Concrete

TYPE OF ANNULAR SEALANT: Aquagard Bentonite Grout

INSTALLATION METHOD: tremie

SETTING TIME: 24 hours

TYPE OF BENTONITE SEAL - GRANULAR, PELLET (SLURRY)
(CIRCLE ONE)

INSTALLATION METHOD: tremie

SETTING TIME: 24 hours

TYPE OF SECONDARY SANDPACK: R.W. Sidley

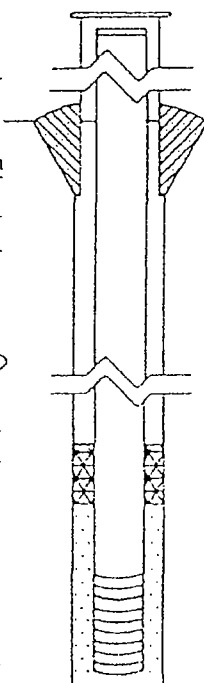
GRAIN SIZE: 100

INSTALLATION METHOD: gravity

TYPE OF SAND PACK: R.W. Sidley

GRAIN SIZE: 10/20 (SIEVE SIZE)

INSTALLATION METHOD: gravity



ELEVATIONS (MSL) *	DEPTHS (BGS)	(.01 ft)
		TOP OF PROTECTIVE CASING
<u>785.38</u>	<u>3.1'</u>	TOP OF RISER PIPE
<u>782.28</u>	<u>0.00'</u>	GROUND SURFACE
<u>778.28</u>	<u>4.0'</u>	TOP OF ANNULAR SEALANT
<u>776.58</u>	<u>5.7'</u>	DEPTH TO WATER
<u>746.28</u>	<u>36'</u>	TOP OF SECONDARY SANDPACK
<u>744.28</u>	<u>38'</u>	TOP OF SANDPACK
<u>740.28</u>	<u>42'</u>	TOP OF SCREEN
<u>735.28</u>	<u>47'</u>	BOTTOM OF SCREEN
<u>735.28</u>	<u>47'</u>	BOTTOM OF WELL
<u>734.28</u>	<u>48'</u>	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

MEASUREMENTS

DIAMETER OF BOREHOLE (in)	<u>6</u>
ID OF RISER PIPE (in)	<u>2</u>
PROTECTIVE CASING LENGTH (ft)	<u>7</u>
RISER PIPE LENGTH (ft)	<u>46.1</u>
BOTTOM OF SCREEN TO END CAP (ft)	<u>0.08</u>
SCREEN LENGTH (1st slot to last slot)	<u>5'</u>
TOTAL LENGTH OF CASING (ft)	<u>51.1</u>
SCREEN SLOT SIZE **	<u>0.01"</u>

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	SS304, SS316, PTFE, PVC OR <u>OTHER: AI</u>
RISER PIPE ABOVE W.T.	SS304, SS316, PTFE, <u>PVC</u> OR OTHER:
RISER PIPE BELOW W.T.	SS304, SS316, PTFE, <u>PVC</u> OR OTHER:
SCREEN	SS304, SS316, PTFE, <u>PVC</u> OR OTHER:

Mallard Lake Landfill Monitoring Well As Built Diagram G-154

Elevation above
Mean Sea Level

Top of PVC Casing : 785.38

Ground Surface : 782.28

Top of annular seal : 778.28

Bottom of Protective
Casing : 778.38

Top of Secondary Sand:
746.28

Top of Sand Pack: 744.28

Top of Screen : 740.28

Bottom of Screen: 735.28

Total Depth : 734.28

Top of PVC Casing : 3.1'

Ground Surface: 0.0'

Top of annular seal : 4.0'

Bottom of Protective Casing : 3.9'

Top of Secondary Sand: 36'

Top of Sand Pack: 38'

Top of Screen : 42'

Bottom of Screen: 47'

Total Depth : 48'

Top of PVC Casing : 785.38

Northing: 4369

Easting: 1024

Ground Surface: 782.28

Type of Surface Seal:
Concrete

Type of Annular Seal:
Aquaguard Bentonite
Grout for Groundwater
Monitoring

Riser Material : Schedule 40 PVC
from 47' to 2.5'

Centralizer (s): yes/no

Riser Diameter: 2 inches

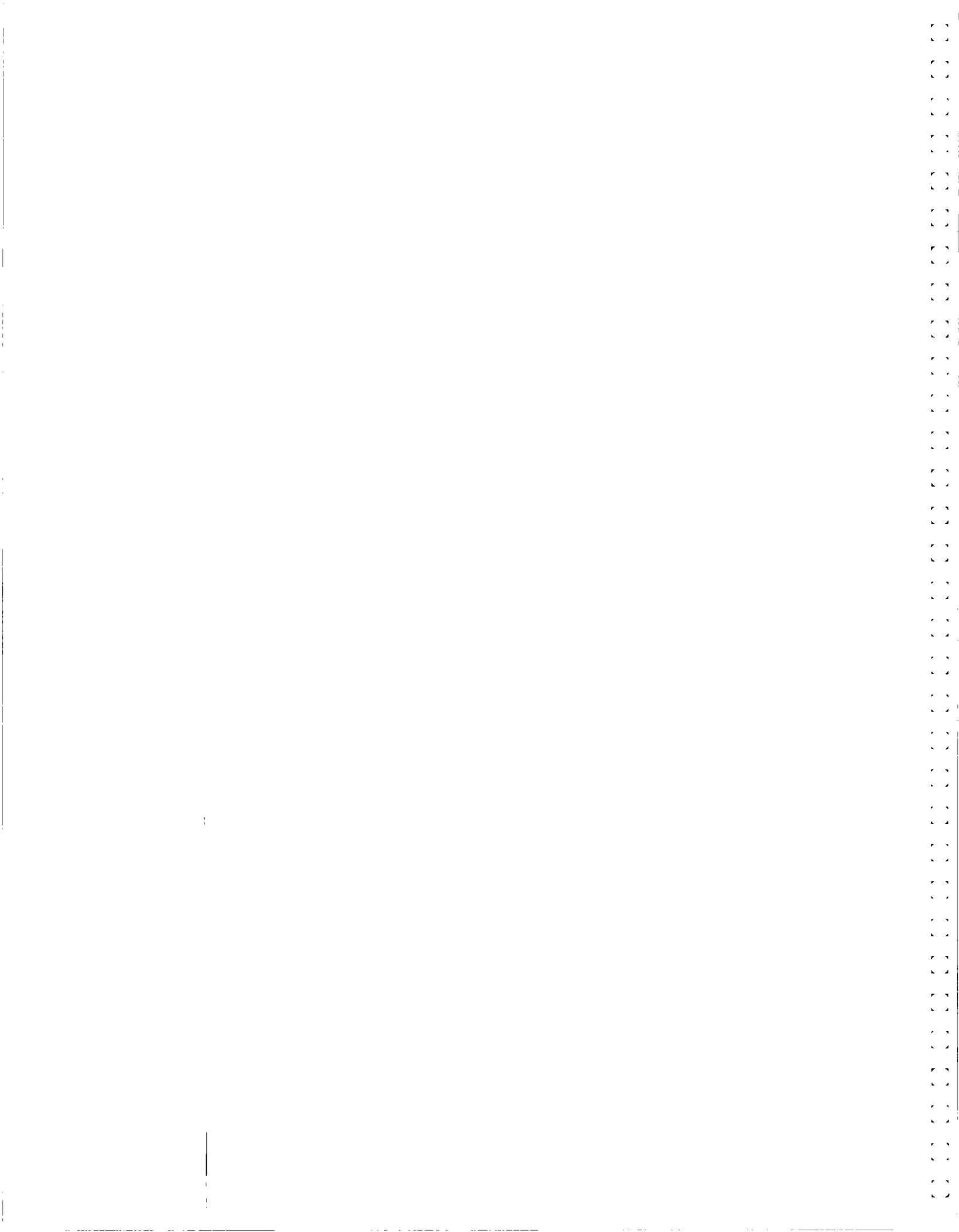
Type of Primary Seal:
Same as Annular Seal

Type of Secondary Sand Pack: R.W.
Sidley 100 grade Sand

Type of Primary Sand Pack:
R.W. Sidney 10/20 Coarse Sand

Screen Slot Size: Campbell
Monoflex Screens 10 Slot
Type

Herst & Associates, Inc.



WELL CONSTRUCTION REPORT

Date October 2, 2000

TYPE OR PRESS FIRMLY WITH BLACK INK PEN, THIS FORM MUST BE COMPLETED WITHIN 30 DAYS OF COMPLETION AND SENT TO THE APPROPRIATE HEALTH DEPARTMENT

1. Date Well Completed September 13, 2000
2. Use: ☐ Domestic ☐ Irrigation ☐ Commercial ☐ Livestock
☒ Monitoring ☐ Other _____

3. Type of Well:

- a. Bored Well: Hole Diameter _____ in. Depth _____ ft.
Casing Diameter _____ in. Buried Slab: [] Yes [] No
- b. Driven Well: Drive Pipe Diameter _____ in. Depth _____ ft.
- c. Drilled Well: Well Diameter 6 in. Depth 48 ft.
Casing Diameter 2 in. Type PVC Joint threaded

Casing Grout:

Oversized

Kind	Drill Hole(In)	From(ft)	To(ft)
R.W. Sidley 1020 Sand	6	47	38
R.W. sidley 100 Grade Sand	6	38	36
Aauaguard Bentonite Grout	6	36	0

Finished In: Unconsolidated ☒ Gravel Pack: ☐ Yes ☐ No

Rock 1	Grain Size	1.00
--------	------------	------

4. Well Disinfected? ☐ Yes ☐ No
5. Date Permanent Pump Installed _____
6. Licensed Pump Contractor _____
License Number _____
7. Pitless Adapter Installed? ☐ Yes ☐ No
Manufacturer _____ Model _____
Attached to Casing - How? ☐ Screwed On ☐ Welded ☐ Compression
8. Type of Well Cap _____
9. Tank Working Cycle _____ gallons Captive Air: ☐ Yes ☐ No
10. Pump and Equipment Disinfected? ☐ Yes ☐ No

General Comments: (If dry hole, fill out log & indicate how hole was sealed.)

Illinois Department of Public Health
Division of Environmental Health - 525 W. Jefferson
Springfield, IL 62761

IMPORTANT NOTICE: This State Agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Public Act 83-4863. Disclosure of this information is mandatory. This form has been approved by the Forms Management Center.

GEOLOGICAL AND WATER SURVEY WELL RECORD

11. Permit Number _____ Date Issued _____
12. Property Owner Forest Preserve District of Du Page County Well # G-154
13. Drilling Company Name Layne Northwest
14. Name of Person who drilled the well Aaron Erickson
15. Well Site Address 26W580 Schick Road
16. Township Name _____ Land ID# _____
17. Subdivision Name _____ Lot _____ Elevation _____ ft.
18. Location: Cnty Du Page Sect 18 Township T40N Range R10E
NW Quarter of the NW Quarter of the NW Quarter

19. Casing and Liner Pipe:

Dia. (In)	Type	From (ft)	To (ft)
2	Schedule 40 PVC	47	0

20. Screen:

Diameter 2 in.

Length 5 ft.

Slot Size 0.01"

Material	PVC
----------	-----

21. Water from _____ at depth _____ ft. to _____ ft.
22. Static Level 5.7 ft. below casing top which is 30 in. above ground level.
Pumping Level _____ ft. Pumping _____ gpm for _____ hours.

- | 2.3. Earth Materials Passed Through | Depth Top(ft) | Depth Bottom(ft) |
|-------------------------------------|---------------|------------------|
|-------------------------------------|---------------|------------------|

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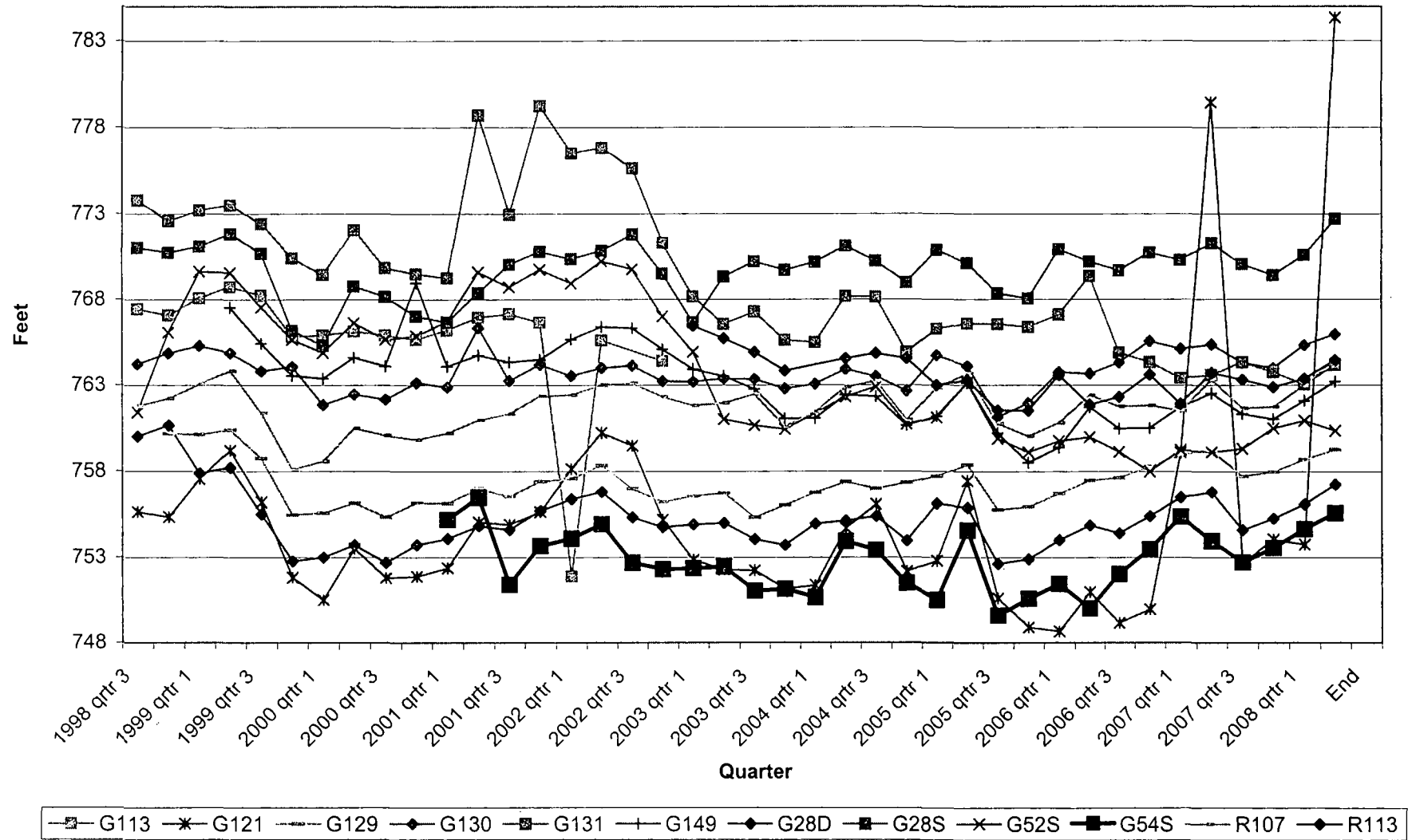
Licensed Contractor Signature

102-003431

License Number

(SEE REVERSE SIDE FOR ADDITIONAL INFORMATION)

Figure 4
Mallard Lake Landfill
W1/W2 Groundwater Elevations (msl)



Attachment 3

Previous Investigation Boring Logs and Well Details



STS Consultants Ltd.

CLIENT
BFI Waste Systems of North America, Inc.LOG OF BORING NUMBER **ML-6I**PROJECT NAME
Mallard Lake Landfill

ARCHITECT-ENGINEER

SITE LOCATION

Hanover Park, ILUNCONFINED COMPRESSIVE STRENGTH
TONS/FT.²PLASTIC LIMIT %
WATER CONTENT %
LIQUID LIMIT %

STANDARD PENETRATION BLOWS/(FT)

UNIT DRY WT.
LBS./FT.³

DEPTH (FT) ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD PENETRATION BLOWS/(FT)
5.0	1	GP		Silty clay - trace gravel - brown - stiff (CL)						
10.0	2	GP								
15.0	3	GP								
20.0	4	GP								
25.0	5	GP		Silty clay - trace gravel, sand - gray - stiff - moist (CL) Note: thin lense sandy silt 26.1 - 26.2						
30.0	6	GP								
35.0	7	GP								
40.0	8	GP								
44.0	9	GP								
	10	GP								
	11	GP		CH ₄ = 0.4%						
				End of boring						

DRAFT

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WL	BORING STARTED 9/2/08	STS OFFICE Chicago - 01
WL	BORING COMPLETED 9/3/08	ENTERED BY PMB
WL	RIG/FOREMAN /	APP'D BY CSR
		SHEET NO. 1 OF 1 STS JOB NO. 200704805

BORING LOG 200704805.GPJ STS.GDT 9/17/08



Illinois Environmental Protection Agency

Well Completion Report

Site Number: 0438010004

County: DuPage

Site Name: Mallard Land Landfill #2

Well #: ML-6I

State

Plane Coordinate: X Y (or) Latitude: Longitude:

Borehole #: ML-6I

Surveyed by:

IL Registration #:

Drilling Contractor: Terra Trace Environmental

Driller: Dennis

Consulting Firm: STS

Geologist: Craig Rawlinson

Drilling Method: Geoprobe

Drilling Fluid (Type): N/A

Logged By: Matt Weiss

Date Started: 9/2/08 Date Finished: 9/3/08

Report Form

Completed By: Matt Weiss

Date: 9/17/08

ANNULAR SPACE DETAILS

DRAFT

Type of Surface Seal: Granular Bentonite

Type of Annular Sealant: Granular Bentonite

Installation Method: Gravity

Setting Time: 24 hours

Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)

Installation Method: Gravity

Setting Time: 24 hours

Type of Sand Pack: Coarse Silica Sand

Grain Size: No. 5 (Sieve Size)

Installation Method: Gravity

Type of Backfill Material: In-situ Clay
(if applicable)

Installation Method: Cave-in

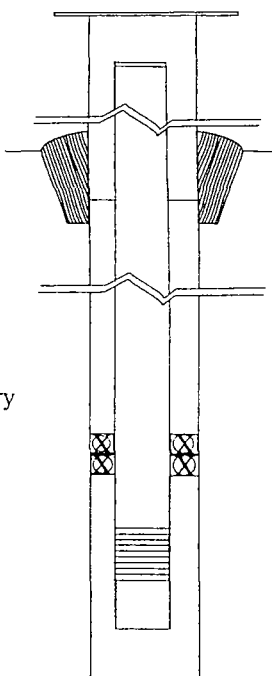
WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other

Elevations
(MSL)*Depths
(BGS)

(.01ft.)



0	Top of Protective Casing
0.5	Top of Riser Pipe
	Ground Surface
1.0	Top of Annular Sealant
39.85	Static Water Level (After Completion)
1.0	Top of Seal
22	Top of Sand Pack
23.3	Top of Screen
42.5	Bottom of Screen
42.7	Bottom of Well
44	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	2.0
ID of Riser Pipe (inches)	0.75
Protective Casing Length (feet)	1.0
Riser Pipe Length (feet)	5.0
Bottom of Screen to End Cap (feet)	0.2
Screen Length (1" slot to last slot) (feet)	19.2
Total Length of Casing (feet)	23.3
Screen Slot Size **	0.010

**Hand-Slotted Well Screens are Unacceptable



STS Consultants Ltd.

CLIENT
BFI Waste Systems of North America, Inc.PROJECT NAME
Mallard Lake LandfillLOG OF BORING NUMBER **ML-6S**

ARCHITECT-ENGINEER

SITE LOCATION

Hanover Park, ILUNCONFINED COMPRESSIVE STRENGTH
TONS/FT.²

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT)
10 20 30 40 50DEPTH(FT)
ELEVATION(FT)

SAMPLE NO.

SAMPLE TYPE

SAMPLE DISTANCE

RECOVERY

DESCRIPTION OF MATERIAL

SURFACE ELEVATION

Blind drill to 20 ft

End of boring

UNIT DRY WT.
LBS./FT.³**DRAFT**

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WL	BORING STARTED 9/3/08	STS OFFICE Chicago - 01
WL	BORING COMPLETED 9/3/08	ENTERED BY PMB
WL	RIG/FOREMAN /	APP'D BY CSR
		SHEET NO 1 OF 1
		STS JOB NO. 200704805

BORING LOG 200704805.GPJ STS GDT 9/17/08



Illinois Environmental Protection Agency

Well Completion Report

Site Number: 0438010004

County: DuPage

Site Name: Mallard Lake Landfill #2

Well #: ML-6S

State

Plane Coordinate: X Y (or) Latitude: Longitude:

Borehole #: ML-6S

Surveyed by:

IL Registration #:

Drilling Contractor: Terra Trace Environmental

Driller: Dennis

Consulting Firm: STS

Geologist: Craig Rawlinson

Drilling Method: Geoprobe

Drilling Fluid (Type): N/A

Logged By: Matt Weiss

Date Started: 9/3/08 Date Finished: 9/3/08

Report Form
Completed By: Matt Weiss

Date: 9/17/08

ANNULAR SPACE DETAILS

DRAFT

Type of Surface Seal: Granular Bentonite

Type of Annular Sealant: Granular Bentonite

Installation Method: Gravity

Setting Time: 24 hours

Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)

Installation Method: Gravity

Setting Time: 24 hours

Type of Sand Pack: Coarse Silica Sand

Grain Size: No. 5 (Sieve Size)

Installation Method: Gravity

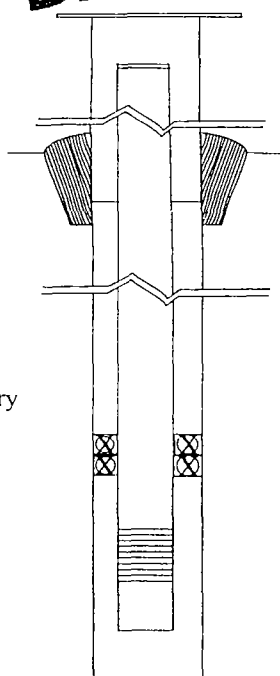
Type of Backfill Material: Coarse Silica Sand
(if applicable)

Installation Method: Gravity

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other

Elevations
(MSL)*Depths
(BGS)

(.01ft.)

Top of Protective Casing

Top of Riser Pipe

Ground Surface

Top of Annular Sealant

Static Water Level
(After Completion)

Top of Seal

Top of Sand Pack

Top of Screen

Bottom of Screen

Bottom of Well

Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	2.0
ID of Riser Pipe (inches)	0.75
Protective Casing Length (feet)	0.8
Riser Pipe Length (feet)	5.0
Bottom of Screen to End Cap (feet)	0.2
Screen Length (1" slot to last slot) (feet)	9.8
Total Length of Casing (feet)	5.0
Screen Slot Size **	0.010

**Hand-Slotted Well Screens are Unacceptable



STS Consultants Ltd.

CLIENT
BFI Waste Systems of North America, Inc.LOG OF BORING NUMBER **GPT-7**PROJECT NAME
Mallard Lake Landfill

ARCHITECT-ENGINEER

SITE LOCATION

Hanover Park, IL

DEPTH(FT) ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²					PLASTIC LIMIT %			WATER CONTENT %			LIQUID LIMIT %		
						1	2	3	4	5	10	20	30	40	50	10	20	30	40
×				SURFACE ELEVATION		⊗													
	1	GP		Silty clay - trace gravel - brown - stiff - (CL)															
5.0	2	GP																	
10.0	3	GP		Silty fine to coarse sand - trace gravel - brown-gray - moist to wet (SM)															
15.0	4	GP																	
20.0	5	GP		Clayey silt - trace gravel, sand - gray (ML)															
				End of boring															

DRAFT

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WL	BORING STARTED 9/2/08	STS OFFICE Chicago - 01
WL	BORING COMPLETED 9/2/08	ENTERED BY PMB
WL	RIG/FOREMAN /	APP'D BY CSR
		SHEET NO. 1 OF 1
		STS JOB NO. 200704805

BORING LOG 200704805.GPJ STS.GDT 9/17/08



STS Consultants Ltd.

CLIENT

BFI Waste Systems of North America, Inc.

PROJECT NAME

Mallard Lake Landfill

LOG OF BORING NUMBER

GPT-8

ARCHITECT-ENGINEER

SITE LOCATION

Hanover Park, IL

UNCONFINED COMPRESSIVE STRENGTH
TONS/FT.²

1	2	3	4	5
PLASTIC LIMIT %				
WATER CONTENT %				
LIQUID LIMIT %				
10	20	30	40	50

STANDARD PENETRATION BLOWS/(FT)				
10	20	30	40	50

DEPTH(FT) ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD PENETRATION BLOWS/(FT)
				SURFACE ELEVATION						
	1	GP		Silty clay - brown - medium - moist (CL)						
5.0	2	GP		CH _d = 0.6%						
10.0	3	GP		Silty fine to coarse sand - gray - wet (SM) CH _d = 0.2%						
15.0	4	GP		Clayey silt - trace sand - gray - medium - moist (ML) Note: suspected blow-in from upper silty sand encountered in 16-20 ft sample						
20.0	5	GP								
				End of boring						

DRAFT

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WL	BORING STARTED 9/2/08	STS OFFICE Chicago - 01
WL	BORING COMPLETED 9/2/08	ENTERED BY PMB
WL	RIG/FOREMAN /	APP'D BY CSR
		SHEET NO 1 OF 1
		STS JOB NO. 200704805

BORING LOG 200704805.GPJ STS.GDT 9/17/08



Illinois Environmental Protection Agency

Well Completion Report

Site Number: 0438010004

County: DuPage

Site Name: Mallard Lake Landfill #2

Well #: GPT-8

State

0 0 0 0 0 0

Plane Coordinate: X Y (or) Latitude: Longitude:

Borehole #: GPT-8

Surveyed by:

IL Registration #:

Drilling Contractor: Terra Trace Environmental

Driller: Dennis

Consulting Firm: STS

Geologist: Craig Rawlinson

Drilling Method: Geoprobe

Drilling Fluid (Type): N/A

Logged By: Matt Weiss

Date Started: 9/2/08 Date Finished: 9/2/08

Report Form

Date: 9/17/08

Completed By: Matt Weiss

ANNULAR SPACE DETAILS

Type of Surface Seal: Granular Bentonite

Type of Annular Sealant: Granular Bentonite

Installation Method: Gravity

Setting Time: 24 hours

Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)

Installation Method: Gravity

Setting Time: 24 hours

Type of Sand Pack: Coarse Silica Sand

Grain Size: No. 5 (Sieve Size)

Installation Method: Gravity

Type of Backfill Material: In-situ Sand
(if applicable)

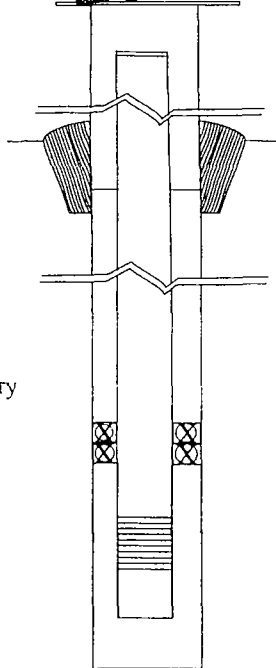
Installation Method: Blow-in

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other

DRAFT



Elevations
(MSL)*

Depths
(BGS)

(.01ft.)

0	Top of Protective Casing
0.5	Top of Riser Pipe
0	Ground Surface
1.0	Top of Annular Sealant
4.60	Static Water Level (After Completion)
1.0	Top of Seal
3	Top of Sand Pack
4.3	Top of Screen
14.3	Bottom of Screen
14.5	Bottom of Well
20	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	2.0
ID of Riser Pipe (inches)	0.75
Protective Casing Length (feet)	0.8
Riser Pipe Length (feet)	5.0
Bottom of Screen to End Cap (feet)	0.2
Screen Length (1" slot to last slot) (feet)	9.8
Total Length of Casing (feet)	4.5
Screen Slot Size **	0.010

**Hand-Slotted Well Screens are Unacceptable



"Drew Bergenthal"
<dbergenthal@dupageforest.
com>

10/23/2008 03:39 PM

To

Subject RE: Mallard Lake

Walter:

Attached is a drawing covering the entire Mallard North Landfill. I would suggest that we use DV-13 or SV-12 to get a gas sample. We do not know what G-119 well cluster is sampling and should be abandoned. The well clusters G-204 and G-205 across the river from G-119 were installed to replace G-119. I believe G-119 has not been sampled since approximately early 2000.

Thank you,

Drew Bergenthal
Environmental Compliance Manager
Forest Preserve District DuPage County
630-462-5655 office

-----Original Message-----

From: Nied.Walter@epamail.epa.gov [mailto:Nied.Walter@epamail.epa.gov]
Sent: Thursday, October 23, 2008 11:35 AM
To: Drew Bergenthal
Cc: Faryan.Steven@epamail.epa.gov
Subject: Re: Mallard Lake

Drew Thank you for this drawing. Do you have a drawing of the entire landfill? Have any of the monitoring wells been screened for CH4? Also, Can the G-119 well cluster be accessed to screen for CH4? Do you analytical results for Groundwater Samples from any of these Monitoring wells? Wally

"Drew
Bergenthal"
<dbergenthal@dup
ageforest.com>

10/23/2008 10:20
AM

To

STEVEN FARYAN/R5/USEPA/US@EPA,
Donna Twickler/R5/USEPA/US@EPA,
WALTER NIED/R5/USEPA/US@EPA,
<john.richardson@epa.state.il.us>
, "Rawlinson, Craig"
<Craig.Rawlinson@aecom.com>

cc

Subject

Mallard Lake

Steve:

Attached is a drawing for Mallard North. Let me know if this works, otherwise I can do more searching. Also, I do not have an email address for Om.

Thank you,

Drew Bergenthal
Environmental Compliance Manager
Office of Environmental Services
Forest Preserve District of DuPage County
(630) 462-5655

Save a tree. Please consider the environment before printing this e-mail.

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(See attached file: MN LCS.pdf)



Mallard North.pdf

Mallard Lake Landfill Status and Transition to IEPA Permits

Update

- The sub-surface fire in the southeast corner of the site seems to be extinguished and the waste mass temperatures have fallen slowly and stabilized. A new subsurface fire was identified on the east side of the landfill near the waste perimeter. A number of gas extraction wells near the new fire have been closed (no vacuum applied), in order to reduce oxygen intrusion and suffocate the new fire.
- Recent perimeter gas monitoring data (August) indicates that there are two new locations where methane levels are exceeding the regulatory standard - 50% or the LEL (25,000 ppm). One location is just east of the newly identified landfill fire. The other location is just north of the originally identified subsurface methane gas plume located under the neighborhood (west of the site), which will slightly expand the characterized plume.
- USEPA is reviewing the Responsible Party (RP) proposed approach to further characterize the subsurface methane contamination detected in August northeast of the site (at ML-6), near an elementary school. (The school has been tested and found to be free of methane. An explosimeter has been installed in the school to provide early warning of methane release.)
- USEPA presented the corrective action plan (CAP) to the community at public meetings on Oct 1. The CAP involves: 1) improvement to the on-site gas collection and management system, the landfill cover and the perimeter gas monitoring and 2) installation of extraction wells in the neighborhood west of the site to remove methane to 50% of the LEL (25,000 ppm), and as low as 5% of the LEL if possible, and treat the methane using multiple mobile combustion units. Due to concerns expressed by the public, USEPA intends to make the enhanced perimeter monitoring data available to the public via the Mallard Lake website.

Background

USEPA intends to continue operating under the Administrative Order on Consent (AOC) for Mallard Lake until 1) the CAP clean-up levels (50% of LEL) are achieved; and 2) an enhanced monitoring system on the west perimeter of facility indicates for a year that methane levels not exceeding 50% of the LEL. Much of the CAP construction and implementation are underway. Seven new gas extraction wells (Phase 1) will be installed west of the landfill in the residential neighborhood and forest preserve, and extracted methane will be destroyed in mobile combustion units. After 5-6 months of extraction, data will be evaluated to determine whether clean-up levels have been achieved under the off-site neighborhood. Concurrently, the nature and extent of contamination investigation on the northeast side of the landfill will continue, in order to determine whether the landfill is the source of this contamination and the enhanced monitoring network on the west side of the facility will be installed.

2). The schedule to achieve the clean-up levels off-site depend on 3 variables – a) the amount of time it takes to develop and implement an improved detection monitoring system and make the data available on the USEPA website; b) whether or not the Phase I wells remove the off-site methane within 5-6 months of implementation; and, c) whether or not the methane contamination near the school is coming from the site, and if so, the recommended remediation strategy. Various scenarios and associated schedules follow:

A) Earliest completion date - Spring 2009 - This assumes: 1) the RPs quickly implement adequate monitoring on the west side to ensure methane is not migrating off-site in excess of 50% of the LEL and the information is made available to the public via the USEPA Mallard Lake website; 2) Phase 1 implementation for 5-6 months, and confirmation data indicating the methane clean-up levels off-site (50% of the LEL, or lower) have been achieved; 3) the landfill is not the source of methane NE of the landfill near the school.

B) Fall 2009 (or later) completion date - This assumes: 1) a Phase 2 (involving additional extraction wells and/or hard-piping of extracted off-site gas to gas to energy plant for treatment) is necessary

and/or 2) the contamination NE of the site near the school is associated with the landfill and remediation is necessary to remove this subsurface methane contamination.

Transition Issues

1. Regardless of the schedule to achieve and maintain the methane clean-up levels, USEPA will require the facility to continue verification gas perimeter monitoring for 12 months under the (AOC). If additional locations of methane exceedances are detected near residential locations or the school, and are attributable to the Mallard Lake Landfill, USEPA will require the facility to achieve the clean-up levels under the AOC. The USEPA verification monitoring requirements will use the same perimeter sampling points as the long-term perimeter monitoring plan required under the current State permit. The only differences will be additional sampling locations on the west side of the site, more frequent monitoring and data submittal, and the data being made available to the public. Overall this monitoring program and reporting frequency is structured to enhance and expand on the existing permit requirements and address the concerns raised by residents at the recent public meeting. USEPA is interested in the transitioning the perimeter monitoring requirements into the IEPA permits once the clean-up levels are reached under and in the vicinity of the residential areas and schools, and the threat of imminent and substantial endangerment has ended.

2. Preliminary data indicates that methane is migrating from the Mallard North Landfill, which is enrolled in the IEPA voluntary site clean-up program. As Mallard North Landfill may be the source of contamination in ML-6, located northeast of the site - close to the school, USEPA requests all information on Mallard North be sent to Steve Faryan.

→ Mallard North Landfill
• Project Mgt
• Files
where is it in process

• Weekly Schedule
• People Plus
• Mallard Update

Summary of Completion Details for Selected Probes
ML-6 Investigation Area
Mallard Lake Landfill
STS Project No. 200704805

Well	Elevation of Top of PVC (ft MSL)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Elevation of Ground Surface (ft MSL)	Elevation of Top of Screen (ft MSL)	Elevation of Bottom of Screen (ft MSL)
MW-204S	776.41	17.9	32.4	774.4	756.5	742.0
MW-204D	777.23	40.2	50.2	774.4	734.2	724.2
MW-204ES	Unknown	3.4	18.4	774.4	771.0	756.0
MW-205	785.8	25.7	40.7	783.6	757.9	742.9
MW-205ES	Unknown	10.6	25.6	783.6	773	758
ML-6	792.56	48	53	792.95	744.95	739.95
ML-6s	792.00	5.2	15.2	792.5	787.3	777.3
ML-6i ¹	792.00	21	41	792.5	771.5	751.5
ML-8	Unknown	21.0	41.0	792	771	751
ML-9	Unknown	25.0	45.0	796	771	751
ML-10	Unknown	27.0	47.0	798	771	751
ML-11	Unknown	19.0	39.0	790	771	751
ML-12	Unknown	20.0	40.0	791	771	751
ML-13 ²	Unknown	7	27	777	770	750
ML-14	Unknown	28.0	48.0	799	771	751
ML-15 ²	Unknown	6	26	776	770	750
ML-16 ²	Unknown	20	40	790	770	750
ML-17	Unknown	20	40	790	770	750
ML-18	Unknown	16.0	36.0	786	770	750
GPT-7 ¹	767.7	3.5	13.5	768	764.5	754.5
GPT-8 ¹	765.7	4.3	14.3	766	761.7	751.7
GPT-9 ²	766.7	30	40	767	737	727
GPT-10 ²	769.7	30	40	770	740	730
GPT-10S ²	769.7	5	15	770	765	755
G54S	785.38	42	47	782.28	740.28	735.28
24 probes	Total Lineal Ft.		705	Drilling this investigation		

Notes:

- Probes are installed but have not been surveyed. Elevations are approximate.
- Probes are not yet installed. Elevations are approximate
- Approximate West Branch of DuPage River Elevation 764 ft MSL
- Base of Mallard Lake Landfill (i.e., Maximum Sump Depth) = \pm 740 ft MSL (Refer to Nature and Extent Report Drawing 1)
- Anticipated screen intervals are an approximation based on probe ML-6i depth, actual screen placement will be determined based on observed geological conditions and results of field gas screening